Contribution of Cereals and Breakfast Cereals to Mineral Availability; Phytate Concentration and Expression of Mineral Transporters

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In ideal scenery, daily food components should contain all the necessary macro and micronutrients for good health. However, in several countries, many nutritive deficiencies, such as of Fe, Ca, Zn and Cd have been identified. The understanding of which genes are involved in the transport of these mineral nutrients to the edible plant parts is of great importance. Amongst the genes involved in this mechanism are the *ferritins*, the *Zips* and the phytosiderophores. Later, when a mineral is ingested, only a fraction is absorbed and used by the organism. Several compounds influence bioavailability, one of which is phytate, the dominant storage of phosphorus in cereals. This work aimed at evaluating phytate concentration in daily diet cereals (*Avena sativa, Hordeum vulgare, Secale cereale, Lolium multiflorum, Zea mays, Triticum aestivum* and breakfast cereals) as well as to study *ferritin, ZIP* and iron phytosiderophore gene expression in different plant parts. RT-PCR analysis showed that *ferritin* was expressed in different wheat tissues, as well as in rye and oat leaf. The *ZIP* gene was expressed in wheat and barley stems and leaves. Corn and ryegrass leaves expressed the *iron/phytosiderophore* gene, as well as oat stem and leaf. Bioinformatic analysis showed that the *ferritin* motif has much more conserved regions than the ZIP motif, suggesting that the *ferritin* gene, in these cereal grains, suffered smaller evolutionary changes. This statement was also supported by the phylogenetic analysis. Phytate was determined using the modified WADE reagent method. However, in order to increase the total phytate extraction from cereal grain samples, several parameters were optimized in the extraction protocol: 1) increased time of digestion to 9 and 16h, 2) increased HCl concentration to 0,8M, and 3) modification in the sample:WADE ratio. First and second parameters allowed extracting the maximum phytate amount. With regards to the phytate concentration, rye, oat and corn showed to have the highest phytate concentration, as well as Nestum Honey and Inflated Wheat with Honey, in case of breakfast cereals.